

Multi-Stakeholder Discussion on Technological Solutions to Illegal Cross Border Redemption of Deposit Containers

November 5th
Lansing, MI

On September 6th, a meeting was held at the Union League Club of Chicago to discuss the problem of illegal cross border redemption of non-deposit containers.

The Attendees:

- Ashlie Keener, Anheuser-Busch Companies
- Terry Staed, Anheuser-Busch Companies
- Paul Lucas, Miller Brewing Company
- Steve Smith, Miller Brewing Company
- Dwayne Kratt, Miller Brewing Company
- Kevin Morris, Coca-Cola Enterprises
- Percy Wells, Coca-Cola Enterprises
- Robert Hunt, Coors
- Genise Smith-Watkins, PepsiCo
- Bill Lobenherz, Michigan Soft Drink Association
- Lou Grech-Cumbo, UBCR, Inc.
- Greg Knoll, TOMRA N.A.
- Peter Lavoie, TOMRA N.A.
- Chuck Regal, TOMRA N.A.
- Bob Lincoln, TOMRA N.A.
- Vemund Ryengen, Tomra Systems ASA
- Amir Novini, Applied Vision

September 6th, 2007

- At the meeting the group agreed to form a **task force** of all stakeholders to combat the problem
- The intent was to find technical solutions to the problem
- The meeting was both business and technical in nature, with the focus on the next meeting to be technology offerings

October 4th, 2007

- Several methods of attacking the problem were laid out and discussed. Among them;
 - Security Marks (Germany)
 - Add-on / Unique barcode
 - Can Rim Ink Detection
 - Lid Incise Detection.

The consensus was to pursue Lid Incise Detection Technology

October 8th, 2007

- A Tomra R&D project was initiated in Norway, under the direction of Andreas Nordhbryn, Chief Scientist
- Internal projects as well as meetings with independent technology companies commenced
- Several Vision companies were contacted, Applied Vision, Pressco, SINTEF, Cognex to name a few.

October 25, 2007

- A meeting was held in Norway to discuss the problem with Don Cochran, Chairman / CEO, and Fredrick (Fritz) Awig, V.P. Customer Support Engineering for PRESSCO, a camera technology company.
- They did not recommend a vision system.
- A new method was suggested, which could utilize a sensor to detect a special ink used on the filling line to indicate deposit vs. non-deposit containers within the RVM.

Attendees:

Marius Loken	Ronald Sivertsen	Vemund Ryengen
Kristian Holmen	Don Cochran	Fredrick (Fritz) Awig.
Peter Lavoie	Andreas Nordhryn	

October 27, 2007

- A meeting was held in Norway with Amir Novini, President/CEO and Joseph Bica, JR. Sr. V.P. of Sales from APPLIED VISION.
- Vision technologies were discussed and some hardware was presented.
- APPLIED VISION demonstrated initial tests done to identify incise marks on can lids, using their proprietary technology.

Attendees:~~Marius Loken~~~~Ronald Sivertsen~~~~Vemund Ryengen~~

Kristian Holmen

Amir Novini

Joseph, Bica, Jr.

Peter Lavoie

October 30th, 2007

- The Stakeholders gathered again to discuss progress made.
- Both Applied Vision and Pressco made presentations to the Stakeholders explaining their specific technologies to solve the problem.
- Pressco demonstrated their concept with a laboratory mock-up
- Timelines and costs for each project are roughly equivalent, and verified by independent sources.

- The following slides are the presentations from both companies as presented to the stakeholder group:



Applied Vision Presentation



Lid Recognition Technology Overview



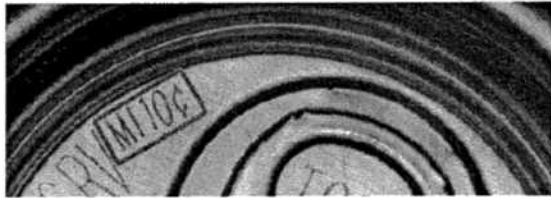
Applied Vision Recommends Vision Recognition of Incising Insignia as the Basis of Reducing Fraudulent Reverse Vending Activities

Advantages:

- The Insignia is Automatically Hard to Duplicate – Built-in “Tamper-proof”
- No Additional Cost for Fillers – It is Already Done

Disadvantages:

- More Challenging to Read on Dirty or Damaged Cans



Cost Estimates

- Phase 1: Applied Vision Will Assume All Expenses to Demonstrate Feasibility and Goodwill

(Estimated cost for phase 1 is ~\$100,000.)

- Phase 2: Time & Material & Expenses
- Phase 3: Time & Material & Expenses
- Phase 4: Time & Material & Expenses
- Phase 5: Time & Material & Expenses

Development Timeline

Phase 1

- **Careful Study of the RVM Mechanical Constraints**
- **Prototype Optical Components to Fit Within RVM**
- **Experiment with Lighting and Existing Algorithm**
- **Working Demo (Alpha) Prototype in Akron**

➤ **60 to 90 Days (Calendar)**

Development Timeline, Cont.

Phase 2

- **Engineer Optical & Processing Integrated Solution**
- **Engineer Mechanical Mounting and Fit into RVM**
- **Finalize Algorithm**
- **Complete Communications Link to RVM from Vision Engine**

➤ **30 to 90 Days**

Development Timeline, Cont.

Phase 3

- Beta Test in Several Machine Types in Akron & Michigan

**Testing of thousands of used cans through modified machines in
“controlled” environment at Applied Vision and or Tomra
Facilities**

➤ 30 Days Minimum

Development Timeline, Cont.

Phase 4

- Beta Test at Selected Retailers in Michigan

➤ **90 Days**

Development Timeline, Cont.

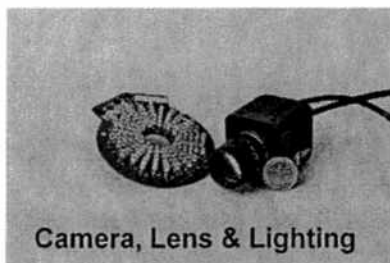
Phase 5

- Commercialization & Full Rollout
- Need Assistance From Tomra to Complete

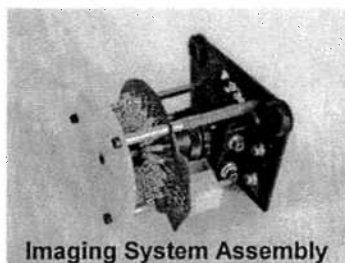
Totals?

- Approximately One Year for Full Implementation
 - Accelerate? – Assign task forces by Tomra and AVC to expedite!
- Development Cost ~ \$750k to \$1.2m

What Would it the Vision Components Look Like?



Camera, Lens & Lighting



Imaging System Assembly



The Processor

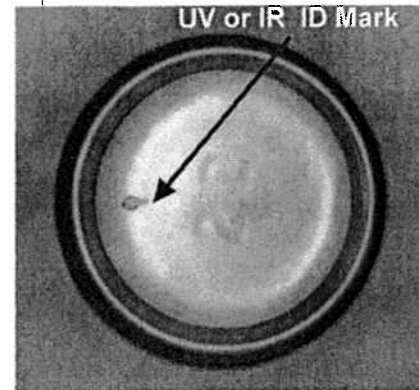
The Use of Ultraviolet or Infrared Ink On Top or Bottom of the Can

Advantages:

- Can be Made More Robust, Easier to Detect by Vision or Sensor-Based Technologies, Especially on Damaged/Dirty Cans

Disadvantages:

- Ink Degradation Over Time
- More Costly and Logistically Hard to Implement by the Fillers
- Less Secure Than Lid Recognition Technology



Conclusion

- Applied Vision is Uniquely Qualified For the More Challenging Incising Recognition Task if that Direction is Chosen
- Applied Vision is Qualified and Willing to Consider and Assist with Other Detection Methods Including Tamper-Resist Ink Technologies

Pressco Presentation

THE STANDARD OF EXCELLENCE IN AUTOMATED INSPECTION WORLDWIDE



PRESSCO TECHNOLOGY INC.

Reverse Vending Proposal

Tom Murphy
Vice President, Sales

Fritz Awig
Vice President, Customer Support Engineering

November 5, 2007



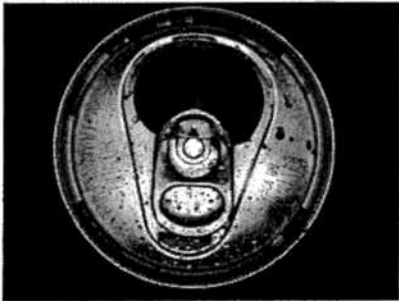
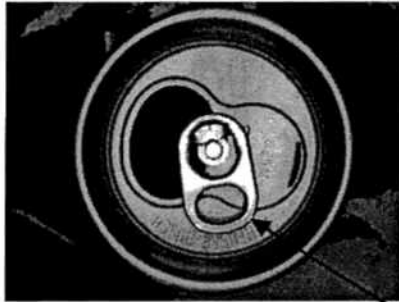
Reverse Vending Investigation Results

- Numerous variables
 - Position of the container
 - Condition of the container
 - Design of the container
- Available space is limited, especially on newer Reverse Vending Machines
- Requires an inexpensive, simple, “set it and forget it” solution
- ***Not a good application for typical machine vision solutions***



Why Not Machine Vision?

- Reverse Vending machine *environment is not favorable* for machine vision
- Vision-based solution is *more expensive*
- Vision-based solution *requires human interaction*
- Vision-based solution *requires more physical space*



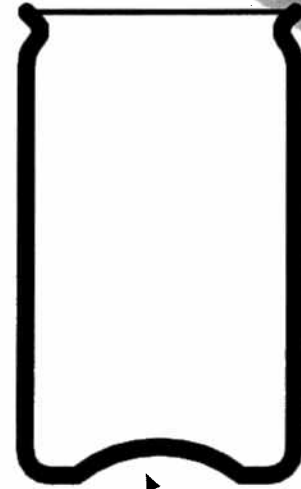
Why Not Machine Vision?

- Too many variables
 - Tab position can hide printing
 - Can/end sizes
 - Distance from camera to converted end (i.e., focus, depth of field, etc.)
 - Grain shine issues
 - Flatness of the converted end (dark/light areas)
 - Numerous converted end designs
 - Numerous printing formats
 - Incomplete printing
 - Contamination
 - RVM material handling precision



Proposed Solution (patent pending)

- Leverage existing processes in manufacturing and filling plants
- Utilize date code printed on the bottom of the can at the filler
- Special additive to date code inks to fluoresce when exposed to specific wavelength illumination
- Incorporate a sensor-based solution combined with Pressco's patented **CHROMAPULSE™** illumination



Proposed application area



Proposed Solution (patent pending)

- ***Minimal changes*** to current processes
 - No change to the printing on converted ends
 - No change to the converted end manufacturing process
 - No change to the can manufacturing process
 - No change to the filling process
 - No change to the date printing process except for using a different ink for cans destined for deposit states



Pressco Solution Advantages

- The system can ***reliably differentiate*** between genuine and fraudulent cans
- It is a ***lower cost solution***
- It is ***easier to set up and maintain***
- It is ***not affected by dome shape or grain shine***
- It can ***withstand the environment*** of the Reverse Vending Machine
- The dome area of the can is ***well protected***



Pressco Solution Advantages

- The ***cost differential is minimal*** between existing methods and the proposed method
- ***No significant changes*** to existing manufacturing or processes are required
- ***No additional or modified capital equipment*** is required at the manufacturer or the filler
- ***Fewer manufacturing logistics issues***
- Several ***technology hurdles have already been solved***
 - Printing date code on the dome area of a filled container
- Actual ***fraudulent activity is easily detectable***



Pressco Solution Advantages

- There are **no health risks** to the consumer
- The typical consumer would be ***unaware of any differences*** between recyclable and non-recyclable containers
- Additional novel techniques are available to ***enhance security***



Project Timeline

- Proof of Concept Unit: Complete
 - Operational Prototype Unit: 4-6 months
 - Integrate & Test in RVM 1-2 months
 - Production Units: 3-4 months after Prototype
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- Next Step: work with ink suppliers to research fluorescent additives



Estimated Pricing

- Development Cost: \$78,000
- Unit Cost: \$2,500 each

Timelines

Security Ink

Months											
1	2	3	4	5	6	7	8	9	10	11	12
Feasibility test				Development					Verification		

Lid Detection

Months											
1	2	3	4	5	6	7	8	9	10	11	12
Feasibility test				Development					Verification		

Summation:

- Tomra can integrate either technology into it's current HCp line of machines
- Working RVM prototypes can be demonstrated in six to nine months, followed by three months of field evaluation and testing
- Rollout of the chosen solution could commence in about 12 months